

**WHAT IS CLAIMED IS:**

1. A gear state diagnostic method using frequency demodulation comprising:
  - (a) detecting a voltage value that is linked to changes in rotational speed of a gear, the voltage value being output by a pulse generator;
  - 5 (b) performing frequency modulation of the voltage value by monitoring means;
  - (c) acquiring the rotational speed of the gear by performing frequency demodulation of the frequency modulated voltage value; and
  - (d) monitoring the demodulated frequency and tracking changes in rotation of
  - 10 the gear to determine whether there are errors in the gear.
2. The method of claim 1 wherein in step (a), the voltage value being output by the pulse generator is expressed as a square wave.
- 15 3. The method of claim 1 wherein in step (a), the voltage value being output by the pulse generator is expressed as a sawtooth wave.
4. The method of claim 1 wherein in step (d), it is determined that there are errors in the gear if a trace of changes in rotation of the gear is non-uniform.
- 20 5. The method of claim 1, wherein said step (c) employs a sampling method.
6. A gear state diagnostic method, comprising:
  - generating a signal corresponding to a rotational gear speed;
  - 25 modulating said signal;
  - demodulating said signal to acquire the gear rotational speed;
  - monitoring the demodulated signal;
  - tracking changes in gear rotation based on said monitored signal; and
  - determining whether errors are present in the gear based on said tracked
  - 30 changes.

7. The diagnostic method according to claim 6, further comprising sampling the modulated signal and wherein said demodulating is a demodulating of the sampled signal.

5 8. The diagnostic method according to claim 6, wherein said determining step comprises determining whether the changes in gear rotation are non-uniform.

9. The diagnostic method according to claim 6, wherein said signal is a voltage value corresponding to rotational gear speed.

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10. The diagnostic method according to claim 9, wherein said voltage value is generated by a pulse generator.

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11. The diagnostic method according to claim 9, wherein said modulating step is a frequency modulation and said demodulating step is a frequency demodulation.

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